

## REMARKS

Claims 1-19 are pending.

Claims 1-19 are rejected.

Claim 11 is amended.

### **35 USC 112, second paragraph.**

Applicants have amended claim 11 to replace the term "the polymer" with "cationic organic polymer".

Applicants believe this amendment repairs the lack of antecedent basis.

No new matter is added.

### **35 USC 103(a)**

Claims 1-13 and 15-17 are rejected under 35 USC 103(a) as being unpatentable over McGrow, US 5,213,693 in view of Batty, US 5,834,545.

McGrow describes the flocculation and dewatering of a suspension of organic solids by filtration on a filter press or belt press by a substantially distributing throughout the suspension dissolved cationic coagulant polymer that has an intrinsic viscosity between 0.2 and 3 dl/g and dissolved cationic flocculant polymer that has an intrinsic viscosity above 5 dl/g (see column 2, lines 58 to 66).

The examiner acknowledges that the claims of the instant invention differ from McGrow in that the second flocculant is mixed into the suspension in the form of particulate polymer. In fact it should be emphasised that McGrow differs from claim 1 in that the second flocculant is mixed in the form of a particulate polymer having a particle diameter of at least 20  $\mu$ m.

McGrow teaches throughout the document that both the coagulant and flocculant have to be dissolved in water before addition to the suspension. The text in column 1, lines 63 to 65 relates to the prior art but nonetheless affirms that it is received wisdom that particulate polymers should be thoroughly dissolved in water before they are added to the suspension that is to be treated.

McGrow found advantageous results by introducing both coagulant and flocculant simultaneously but in the same way as the prior art the coagulant and flocculant of McGrow are dissolved and therefore in solution (as indicated in the aforementioned reference at column 2, lines 58 to 66).

McGrow does however include the possibility that the coagulant may be added as coagulant beads and the solution of anionic flocculant added substantially simultaneously (column 3, lines 13 to 19). However, this is in the context of the preceding text at lines 8 to 12 in which it is explained that the coagulant beads dissolve very quickly and hence would act on the suspension upon dissolving. This would be contrary to the process of the present invention in which the first flocculant brings about flocculation and assists thickening and the second flocculant further dewateres the thus thickened suspension. By further dewatering the suspension thickening must already have taken place. This clearly could not take place in the process of McGrow where the coagulant dissolves very quickly. Furthermore, in McGrow the cationic coagulant particles are added with the solution of anionic flocculant. This also would be contrary to the requirements of claim 1 of the present invention in which the first and second flocculants are not counterionic.

McGrow states that preferably the process employs simultaneously adding preformed solutions of both cationic flocculant and cationic coagulant and most preferably in which both are present in a single preformed solution (column 3, lines 20 to 26).

Even where McGrow refers to a particulate mixture of cationic coagulant polymer and cationic flocculant polymer the particulate mixture must be dissolved in water to form a treatment solution, <sup>0.00</sup> before addition to the suspension to be treated (see column 3, lines 27 to 39 and also claim 1, claim 6 and the only example) and therefore McGrow would appear to avoid the addition of preformed mixture of particles containing both particulate coagulant and flocculant. The requirement to dissolve the blended particulate composition to achieve full dissolution before application to the suspension to be treated is emphasised in column 6, lines 3 to 7 of McGrow.

With regard to the passage in column 2, lines 24 to 40 this describes the general acceptance of preference to single treatment systems but the importance of accurate dosing in order to avoid overdosing which could lead to large gelatinous flocs which can release free water very quickly and cause blockage of feed holes. Therefore this teaches the avoidance of overdosing with a single treatment of a conventional flocculant which of course would be in solution rather than the avoidance of adding the flocculants in particulate form.

McGrow is also silent on a process in which the first flocculant assists thickening and the second flocculant further dewateres the suspension which inevitably must be a thickened suspension in order to further dewater.

In fact in McGrow since both the cationic coagulant polymer and cationic flocculant polymer must both be added as aqueous solutions the coagulant polymer will bring about coagulation by charge neutralisation and aggregation whilst the flocculant will bring about flocculation and then complete dewatering in one step. There is no suggestion in McGrow to bring about a thickening of the suspension with a first flocculant and then further dewater this suspension that has undergone thickening with a second flocculant. In fact where the application of particles of coagulant is suggested in combination with dissolved anionic flocculant in column 3, lines 8 to 19, it is expected that the coagulant will dissolve very quickly and therefore by inference act upon the suspension simultaneously with the anionic flocculant. Clearly such a fast dissolving coagulant would have dissolved and coagulated the suspension before thickening had taken place. Therefore McGrow does not contemplate a system which would result in first thickening the suspension with a first flocculant followed by further dewatering of this suspension with a second flocculant.

The examiner states that Batty et al discloses that it is known in the art to mix a flocculant composition including polymer particles with a suspension to aid in dewatering the suspension. From this the examiner concludes that it would have been obvious to modify the process of McGrow by utilising the recited particulate polymer in view of the teachings of Batty.

Nevertheless Batty is directed to a product containing water-soluble or water swellable polymer particles and a wax and in which the water-soluble or water swellable polymer particles have been made by reverse phase polymerisation and have a size of at least 90% by weight below 10  $\mu\text{m}$  (column 2, lines 30 to 38). Batty states that the product containing both the water-soluble or water swellable polymer particles and a wax may take a wide variety of physical forms and include granules having a maximum dimension below 30 mm or 20 mm and preferably particles which are at least 90% by weight in the size range of 100 to 1000  $\mu\text{m}$  (see column 5, lines 49 to 59). Although the product containing both the polymer and the wax may indeed have particle sizes greater than 20  $\mu\text{m}$  Batty is silent on the polymer i.e. the water-soluble or water swellable polymer, equating to the second flocculant in claim 1 of the instant invention, having a particle size of at least 20  $\mu\text{m}$ .

The products of Batty are predominantly for textiles. However, it is also stated that the products may be used in other applications including the promotion of sedimentation, thickening or dewatering of suspensions, for instance as bridging flocculants or as coagulants (see column 6, lines 55 to 58). It is further stated in the paragraph bridging columns 6 and 7 that the polymers may be wholly water-soluble or they can be cross-linked particles of size below 10  $\mu\text{m}$  and often below 2  $\mu\text{m}$ .

Batty also states that the flocculants can be mixed directly into the sewage, cellulosic, mineral or other suspension that is to be flocculated but emphasises the general desirability of dissolving the particles and thus the polymer particles into water to form a dilute solution having a polymer concentration of between 0.01 and 3% and then to add this diluted solution to the suspension to be treated (see column 7, lines 13 to 20). Nevertheless Batty does not contemplate using such flocculant products for further dewatering on an already thickened suspension as required by claim 1 of the present invention.

In fact the objective of Batty appears to be to provide an alternative to polymer products that are normally available in reverse phase dispersions. Batty refers to such reverse phase dispersions containing an oil phase which would normally result in the introduction of the oil phase into the medium that is being treated by the polymer and the desirability to eliminate the oil before use (see column 2, lines 6 to 13). Batty also refers to processes known for precipitating polymer particles from a reverse phase dispersion and collecting the powder so formed although describes that this can introduce storage and handling problems (see column 2, lines 13 to 18). Batty claims that an objective is to provide a solid composition which avoids the dusting problems with polymer fines both during manufacture and use and yet allows the particles to perform in use as individual particles having a very fine size below 10  $\mu\text{m}$  (see column 2, lines 19 to 29). The performance benefits of such small particles having particle sizes below 10  $\mu\text{m}$  is indicated in column 1, lines 39 to 48.

Therefore since Batty emphasises the performance value of having flocculant polymers of size below 10  $\mu\text{m}$  there would be no reasonable expectation of success in obtaining any improvements by instead providing much larger flocculant particles of size at least 20  $\mu\text{m}$ . Batty does not suggest any desire to delay the dissolution of the flocculant polymer nor provide a system in which a suspension that has already been thickened is further dewatered in a separate step.

Consequently even if the skilled person adapted McGrow by replacing the flocculant with the products of Batty the flocculant will be in the form of particles of below 10  $\mu\text{m}$ . Such particles being introduced

simultaneously with the coagulant would dissolve and bring about flocculation in the same manner as the flocculant solutions of McGrow, that is before thickening has taken place. Therefore there would be no further dewatering of the suspension that has been first thickened as a two-step process.

Therefore claim 1 as amended is not obvious over McGrow in view of Batty.

**Claim 14 is rejected under 35 USC 103(a) as being unpatentable over McGrow, in view of Batty and further in view of Sorensen, US 5,846,433.**

Examiner uses Sorensen to provide the disclosure of flocculant polymer introduced in the form of small particles (below 10 micron) may be used while part at least of it remains in particulate form. See col. 7, lines 55-58.

One of the primary purposes of Batty's invention is to provide a novel way of delivering fine reverse phase polymer particles in the form of a solid composition which avoids the dusting problems associated with polymer fines, both during manufacture and use, and yet which allows the particles to perform in use as individual particles having a very fine size, below 10 microns. Col. 2, lines 25-29.

Thus the solid product of the Batty invention is a particulate with each particle being a dispersion of the polymer particles in the wax. Generally the particle size is at least 50 microns. See col. 5, lines 49-59.

Thus it makes little sense to combine Sorensen with Batty as incorporation of the particulates described in Sorensen (10 micron particles) would defeat the low dusting advantages of Batty's invention.

### **Double Patenting Rejections**

Claims 1-11, 18 and 19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 5-14 of copending 10/591,776 (Case 22354).

Applicants request to put off the submitting of terminal disclaimers until the state of the allowed claims is known. At that time, the suitability of such disclaimers can be better determined.

Reconsideration and withdrawal of the rejection of claims 1-19 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1-19 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

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Respectfully submitted,



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